

The Relationship between Problematic Mobile Use and Sleep Quality among Nursing Students: The Mediating Role of Perceived Stress

Majid Sadoughi^{1,*}, Zahra Mohammad-Salehi¹

¹ Department of Psychology, Faculty of Humanities, University of Kashan, Kashan, Iran.

* **Corresponding author:** Majid Sadoughi, Department of Psychology, Faculty of Humanities, University of Kashan, Kashan, Iran. E-mail: Sadoughi@kashanu.ac.ir.

DOI: 10.29252/ANM-027033

Submitted: 16/05/2017

Accepted: 29/07/2017

Keywords:

Excessive Mobile Use
Sleep Quality
Perceived Stress
Students, Nursing

How to Cite this Article:

Sadoughi M, Mohammad-Salehi Z. The Relationship between Problematic Mobile Use and Sleep Quality among Nursing Students: The Mediating Role of Perceived Stress. *Adv Nurs Midwifery*. 2017;27(2):15-20. DOI: 10.21859/ANM-027023

© 2017. Advances in Nursing and Midwifery

Abstract

Introduction: Excessive and problematic use of mobile phones could have several negative effects on different aspects of students' lives. The current study aimed to explore the relationship between excessive mobile uses and sleep quality among nursing students considering the mediating role of perceived stress.

Methods: In This descriptive study with a correlational design, 138 nursing students (103 females, 35 males) were selected using the random sampling method. To collect the data, cell-phone over-use scale (COS), Pittsburgh sleep quality index (PSQI), and Cohen's perceived stress scale were used. The data were analyzed using Pearson product moment correlation, Independent Samples t test, and hierarchical regression analysis by the SPSS 22 software.

Results: The mean scores of students' mobile use, sleep quality, and perceived stress were 52.17 ± 14.70 , 11.8 ± 2.69 , and 22.60 ± 6.45 , respectively. There was no statistically significant difference in the aforementioned variables among male and female nursing students. The results of hierarchical regression analysis showed that mobile use in the first model could predict students' sleep quality ($\beta = 0.38$). By entering the perceived stress to the equation, β of mobile use decreased, which showed the incomplete mediating role of perceived stress.

Conclusions: Problematic mobile use has not only direct adverse health consequences but also indirect negative effects on students' sleep quality through perceived stress. The findings yield significant insights for parents, education practitioners, health specialists, and policy makers in making interventions regarding the excessive, and problematic mobile use among nursing students.

INTRODUCTION

Mobile phones were first meant to serve communication purposes; however, nowadays they are increasingly used in our daily lives to fulfill a wide range of functions such as listening to music, playing games, browsing the Internet, taking videos/photos, etc. This is due to the fact that they are easily accessible, provide their users with security, and have a key role in social communication [1], thus attracting the attention of different social groups including students [2]. In the context of Iran, a recent study by Mohammad-beigi [3] found 85% of the Iranians use this device, and 58% of teenagers connect to the Internet via their smart phones. Apart from the positive effects of mobile phones on productivity as well as convenience in academic and professional settings, they might cause Internet and mobile phone addiction if used excessively [4]. Recent research has indicated several negative consequences of excessive mobile use including poor sleep quality [5, 6] and decreased levels of academic performance [7], mental health [8, 9], and life satisfaction [7]. In addition, the EMF radiations of mobile

phones might cause several serious health problems such as headache, sleep disturbance, short-term memory impairment, lack of concentration, dizziness, and high blood pressure [10, 11]. More specifically, mobile phone use after lights out has a relationship with sleep disturbances such as short sleep duration, subjective poor sleep quality, excessive daytime sleepiness, and insomnia symptoms [12]. Furthermore, exposure to mobile phone emissions at night could affect melatonin-onset time [13].

Insomnia is common across all developmental stages. In fact, recent research shows university students are very susceptible to sleep disturbances, frequently experiencing significant shifts in their sleep-wake cycle and becoming prone to serious health problems [14]. In addition, students perceiving accessibility via mobile phones as stressful reported the highest risk of mental health symptoms in the follow-up studies [5]. Also, since smartphones are more likely to be used for multitasking, they can possibly cause much stress for their users by limiting their relief [15]. Several studies

have reported the prevalence of sleep problems and poor sleep quality among students all over the world [16, 17]. Moreover, poor sleep quality has a relationship with maladaptive behaviors [18, 19]. Medical students are a group who face high risks of sleep deprivation because of demanding clinical duties and academic expectations [20]. Several studies have shown that nursing students display high levels of stress [21, 22], which might affect their quality of sleep [4]. For example, Lundet al. found 68% of nursing students reported that stress negatively affected their sleep initiation [18]. In addition, multiple regression analyses showed that tension and stress predicted 24% of the variance in the Pittsburgh sleep quality index (PSQI) score, while exercise, alcohol and caffeine consumption, and sleep schedule consistency could not account for sleep quality [18]. Similarly, in another study on Chinese adolescents, perceived stress was found to be the most important risk factor for poor sleep quality [23] and can predispose individuals and increase their sleep difficulties [24].

Overall, high levels of perceived stress associate with poor sleep quality, anxiety, depressive symptoms, irritability, attention and concentration difficulties, poor academic performance, and eating disorder [25, 26]. Also, the perceived stress on the night before clinical experiences reduces students' sleep quality and decreases their sleep duration [27]. Also, the results obtained by Benavente [28] showed that high levels of stress cause low sleep quality. Perceived stress might induce more sleep problems among students [29]. Moreover, nursing students' low sleep quality can result in their fatigue, which can seriously affect their consciousness, concentration, temperament, efficiency, awareness, and argument [30]. It seems excessive mobile use can cause stress for students, and in turn, decrease their sleep quality. However, considering the utmost importance of sleep quality among nursing students for their profession, unfortunately not much is known about this issue in the context of Iran. In fact, research should address how excessive mobile use can lead to low sleep quality. In this vein, exploring mediatory factors can shed more light on this relationship. Therefore, the present study aimed to explore the relationship between excessive mobile use and sleep quality by considering the mediating role of perceived stress among Iranian nursing students.

METHODS

The present study was descriptive with a correlational design. The statistical population consisted of 566 nursing students in Kashan University of Medical Sciences in the 2015-2016 academic year. One hundred and fifty nursing students were randomly selected via stratified sampling (according to gender) based on the Cochran's Sample Size Formula. After excluding 12 incomplete questionnaires (a return rate of 92%), 138 ones (103 for females, 35 for males) were analyzed. The data collection instruments included cell-phone over-use scale (COS), Pittsburgh sleep quality index (PSQI), and Cohen's perceived stress scale (CPSS). The Pittsburgh sleep quality scale, originally developed by Buysse et al. [31], was used to assess the quality and quantity of sleep in the month

preceding its application among the students. This instrument comprises 19 items which load on seven major factors, namely, subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. It is noteworthy that this questionnaire has been validated in the context of Iran [32, 33]. The total score is calculated by summing up scores obtained from each individual sub-scale. The range of each sub-scale score and total score are 0-3 and 0-21, respectively, with higher scores indicating worse sleep quality. For each component, 0 indicates no sleep difficulty, 1 mild difficulty, 2 severe difficulty, and 3 very severe difficulty in sleep. The cut-off point of the total score is 5, where scores higher and lower than 5 indicate normal and poor sleep quality, respectively [31].

The perceived stress scale was used to measure students' perceived stress and control level in the month prior to its application [34]. There are 14 items in this scale, each seeking students' response about (non)occurrence of a special event; moreover, if the responses were affirmative, the students had to indicate their perceived stress and lack of control on a five-point scale ranging from 0 (never) to 4 (very often), and the total score is between 0 and 56. Higher scores in this scale indicate higher stress levels and perceived lack of control. The Cronbach's alpha for this scale is 0.69, and the total score is calculated by summing up all 14 items [34]. The Cronbach's alpha coefficient was calculated as 0.80 in an Iranian sample [35]. In this study, it was calculated as 0.70. The cell-phone over-use scale [36] was used to evaluate students' pathological mobile phone use. This scale consists of 23 questions based on a 6-point Likert scale ranging from "Never" to "Always". Moreover, its Persian version has been validated by Golmohammadian and Yaseminejad [37] with a Cronbach's alpha coefficient of 0.903 and test-retest reliability coefficient of 0.714 ($P \leq 0.005$). As for scoring, scores above 75 and below 25 are considered as 'excessive user' and 'rare user', respectively. To determine the mediating role of stress in the relationship between excessive mobile use and sleep quality, hierarchical linear regression analysis was used to analyze the data using the SPSS software (version 22).

RESULTS

The mean ages of female and male students were 20.72 ± 2.01 and 21.08 ± 1.46 years, respectively. The mean values of mobile use were 51.15 ± 14.8 and 55.17 ± 14.20 among female and male students, respectively. Regarding the sleep quality, 11.38 ± 2.54 and 10.57 ± 3.03 were the mean values of sleep quality for female and male students, respectively. Finally, the mean values of perceived stress were 22.98 ± 6.11 and 21.51 ± 7.32 among female and male students, respectively. The results of Independent Samples t test indicated no significant difference in terms of the research variables among male and female students (excessive mobile use: $t = 1.40$, $P = 0.16$; sleep quality: $t = -1.59$, $P = 0.12$; perceived stress: $t = 1.16$, $P = 0.24$). Table 1 shows descriptive statistics and correlation coefficients for excessive mobile use, sleep quality, and perceived stress.

Table 1: Descriptive Indices and Matrix of Pearson's Correlation Coefficients for Nursing Students

Variable	Mean	Standard deviation	Mobile use	Sleep Quality	Perceived stress
Mobile use	52.17	14.7	-		
Sleep Quality	11.18	2.69	0.38**	-	
Perceived stress	22.6	6.45	0.33**	0.35**	-

**P < 0.01

Table 2: Regression Coefficients of Mediating Role of Perceived Stress in Relationship between Mobile Use and Sleep Quality

Predictable variable	B	SE	β	t	sig
1					
Intercept	7.52	0.78	-	9.57	0.00
Mobile use	0.07	0.014	0.38	4.83	0.00
2					
Intercept	5.94	0.917	-	6.48	0.00
Mobile use	0.55	0.015	0.30	3.67	0.00
Perceived stress	0.10	0.034	0.25	3.09	0.002

Table 3: Direct and Indirect Effects of the Variables

Path	Regression standardized coefficients(β)	sig	Bootstrapping P value
Direct effect of excessive mobile use on sleep quality	0.30	0.001	0.007
Direct effect of excessive mobile use on perceived stress	0.33	0.001	0.004
Direct effect of perceived stress on sleep quality	0.25	0.002	0.005
Indirect effect of excessive mobile use on sleep quality	0.08	0.001	0.003
Total effect of excessive mobile use on sleep quality	0.38	0.001	0.007

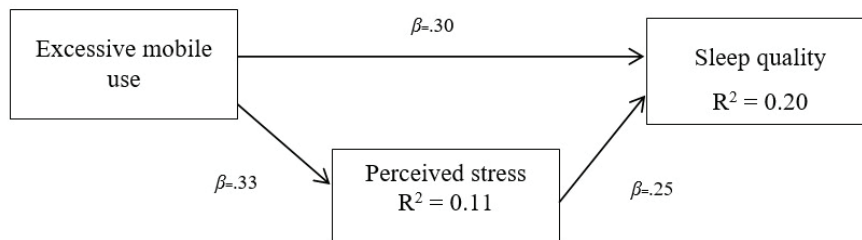


Figure 1: Regression Model of the Mediating Role of Perceived Stress

Table 1 shows the correlations among excessive mobile use, perceived stress, and sleep quality. As expected, excessive mobile use was positively associated with PSQS's scores. It is noteworthy that higher scores in this perceived sleep quality scale (PSQS) are indicative of sleep disturbances and poorer sleep quality. There was a positive correlation between excessive mobile use and perceived stress ($r = 0.33, P < 0.01$) and negative correlation between perceived stress and sleep quality ($r = 0.35, P < 0.01$). Since we were interested in the potential mediating role of perceived stress on the relationship between excessive mobile use and sleep quality, and because initial correlational analyses provided basic evidence for the importance of excessive mobile use, subsequent hierarchical regression analyses were performed. In the first step, excessive mobile use was entered. Next, perceived stress was entered. Table 2 demonstrates the results of these analyses.

Regression coefficients (β) from the final as well as the penultimate step of the model are shown in Table 2. According to this table, a potential mediation effect is suggested based on which the effect by excessive mobile use is mediated through perceived stress. It is noteworthy that we followed recommendations by Baron and Kenny [38] to complete the statistical test for mediation. More specifically, by addition of the perceived stress to the equation in step 2, stress decreased the relationship between excessive mobile use (from $\beta = 0.38$ to $\beta = 0.30$) and sleep quality. To assess whether these changes were statistically significant, the Sobel test was used. Findings from the Sobel Test indicated that perceived stress partially mediated the effect of excessive mobile use on sleep quality. Table 3 shows the direct and indirect effects of variables in the regression model.

As it can be seen from Table 3, excessive mobile use had not

only direct adverse health consequences but also indirect negative effects on students' sleep quality through perceived stress. Percent mediation (P_M) was 21.05, which indicated stress could explain 21.05% of mediation between excessive mobile uses and sleep quality; moreover, the rest of this mediation (78.95%) is justifiable by other factors. All in all, excessive mobile use along with the mediating role of perceived stress could explain 20% of sleep quality variance among the students (see Fig. 1).

DISCUSSION

The findings of the present study showed that students' excessive mobile use has a statistically significant relationship with their sleep quality and can predict it ($\beta = .38$), which is in line with Sahin [6], Thomée [5], Ahn and Kim [4], Mohammadbeigi [3]. In a study conducted by Jin-jian [39], it was found that 8.1% and 37.8% of the students suffered serious and mild mobile phone independence, respectively. This could be justified by the fact that students' sleep quality has deteriorated due to their excessive mobile use. In fact, mobile use at night has a significant relationship with medical students' sleep quality, and students who use their mobile phones more than 2 hours a day experienced sleep deprivation and daily somnolence [40]. Excessive mobile use at night can disturb sleep and wake cycle by affecting melatonin spatter and increase the risk of mental health problems such as depression, stress, anxiety, and social dysfunction [6, 41]. Mobile use more than 5 hours a day negatively influences sleep quality of the students [6]. The results of another study undertaken by Silva et al. [42] revealed that decreased sleep quality and more daytime somnolence reduce alertness and cause higher levels of anxiety among female nursing students. Thomee et al. [5] found that, after a one-year follow-up, excessive mobile use has a relationship with sleep disturbances and mental health symptoms among men and with depression symptoms among women. With respect to stress, a statistically significant correlation was found between perceived stress and excessive mobile use, i. e., students who used mobile phones excessively developed more stress, which is in line with Beranuy [9], Thomée [41], and Samaha [43]. Reinecke et al. [44] found that failure in self-control and lack of resistance against tendency to use media leads to guilty, which could justify the relationship between excessive mobile use and increased stress. Also, the obtained results could be justified by considering the fact that smartphones are so accessible and prevalent nowadays because they provide access to not only a telephone but also the Internet simultaneously. However, excessive mobile usage can cause much stress for their users [45]. As Reinecke [46] found, communication load caused by social media messages and Internet multitasking has a direct relationship with perceived stress. This is mainly due to poor time management, social dysfunction, and some side effects such as exchanging messages late at night, losing social contact with people in real world, and serious emotional dependence on mobile [45]. In addition, stress could have negative effects on a person's health status and health behaviors, e. g., sleep-wake cycle and sleep quantity and quality [47]. As Ahn and Kim [4] found, there is a significant correlation between nursing students' smartphone use and their perceived stress, both of which can explain decreased sleep

quality. Therefore, tension and stress are evidently two influential factors in predicting sleep quality. For example, in a study conducted by Lund et al. [18], most respondents considered stress, mainly academic and emotional, as a key factor negatively influencing their sleep initiation. Overall, mobile use after lights off causes much difficulty for students to sleep. On the other hand, it seems that there is a circular causality between sleep quality and perceived stress, and they mutually influence each other. Thus, in addition to the aforementioned research on the effect of stress on sleep quality, stress is also affected by sleep quality. For example, Myers et al. [48] found healthy sleep practices, as a protective factor, significantly reduce perceived stress among college students. Also, sleep hygiene has a direct relationship with daytime sleepiness and fatigue, and in turn with stress [49, 50]. Although mobile phones have several beneficial usages in our daily lives, they can negatively influence students' psychological health, sleep, and academic performance [51]. As research indicates, mobile phone use after lights out, even for a moderate amount of time, is harmful in that it can cause long-term tiredness [52]. Due to attractiveness and various applications of mobile phones, many students neglect their negative aspects such as time waste, occupation of psychological and cognitive capacities, loss of efficient study time, mobile phone dependence, and anxiety while attending to academic affairs. In addition to direct negative influences, excessive mobile use has negative and indirect (via stress) influences on students' sleep quality. Hence, students' awareness about direct and indirect negative consequences of excessive mobile use should be raised by offering essential education to nursing students in order to prevent further problems. Moreover, it is essential to perform behavioral and cognitive interventions to change mobile use pattern and improve students' sleep quality. Furthermore, effective measures could be taken; for example, various useful sports and entertainment programs are highly recommended to prevent mobile phone addiction among students. Since a considerable amount of mobile usage is devoted to cyber space, it is suggested that key factors in modern media such as the Internet and social networks in cyber space and their effects on students' sleep quality and perceived stress be extensively studied. Suitable interventions could play a key role to improve the quality of mobile use, decrease the perceived stress and enhance sleep quality.

ACKNOWLEDGEMENTS

We like to show our gratitude to students in Kashan University of Medical Sciences and Health Services for their corporation.

CONFLICTS OF INTEREST

There is no conflict of interest of financial disclosure with this study.

FUNDING

This study did not have any funds.

ETHICAL CONSIDERATION

This research was approved by ethics committee of the facul-

ty of Humanities, University of Kashan. All participants were informed of the purpose of the study, and their oral consent was obtained

AUTHOR CONTRIBUTIONS

Sadoughi M: Supervisor, Statistical Analysis, manuscript preparation, Critical revision of the manuscript. Mohammad-Salehi Z: Study design, Data collection, Drafting of the manuscript.

REFERENCES

- Balakrishnan V, Raj RG. Exploring the relationship between urbanized Malaysian youth and their mobile phones: A quantitative approach. *Telemat Inf.* 2012;29(3):263-72. DOI: [10.1016/j.tele.2011.11.001](https://doi.org/10.1016/j.tele.2011.11.001)
- Dixit S, Shukla H, Bhagwat A, Bindal A, Goyal A, Zaidi AK, et al. A study to evaluate mobile phone dependence among students of a medical college and associated hospital of central India. *Indian J Community Med.* 2010;35(2):339-41. DOI: [10.4103/0970-0218.66878](https://doi.org/10.4103/0970-0218.66878) PMID: [20922119](https://pubmed.ncbi.nlm.nih.gov/20922119/)
- Mohammadbeigi A, Absari R, Valizadeh F, Saadati M, Sharifmoghdam S, Ahmadi A, et al. Sleep Quality in Medical Students; the Impact of Over-Use of Mobile Cell-Phone and Social Networks. *J Res Health Sci.* 2016;16(1):46-50. PMID: [27061997](https://pubmed.ncbi.nlm.nih.gov/27061997/)
- Ahn S-Y, Kim Y-J. The Influence of Smart phone Use and Stress on Quality of Sleep among Nursing Students. *Indian J Sci Technol.* 2015;8(35).
- Thomé S. ICT use and mental health in young adults. Effects of computer and mobile phone use on stress, sleep disturbances, and symptoms of depression: Institute of Medicine. Department of Public Health and Community Medicine; 2012.
- Sahin S, Ozdemir K, Unsal A, Temiz N. Evaluation of mobile phone addiction level and sleep quality in university students. *Pak J Med Sci.* 2013;29(4):913-8. PMID: [24353658](https://pubmed.ncbi.nlm.nih.gov/24353658/)
- Lepp A, Barkley JE, Karpinski AC. The relationship between cell phone use, academic performance, anxiety, and Satisfaction with Life in college students. *Comp Hum Behav.* 2014;31:343-50. DOI: [10.1016/j.chb.2013.10.049](https://doi.org/10.1016/j.chb.2013.10.049)
- Rosen LD, Lim AF, Felt J, Carrier LM, Cheever NA, Lara-Ruiz JM, et al. Media and technology use predicts ill-being among children, preteens and teenagers independent of the negative health impacts of exercise and eating habits. *Comp Hum Behav.* 2014;35:364-75. DOI: [10.1016/j.chb.2014.01.036](https://doi.org/10.1016/j.chb.2014.01.036)
- Beranuy M, Oberst U, Carbonell X, Chamarro A. Problematic Internet and mobile phone use and clinical symptoms in college students: The role of emotional intelligence. *Comp Hum Behav.* 2009;25(5):1182-7. DOI: [10.1016/j.chb.2009.03.001](https://doi.org/10.1016/j.chb.2009.03.001)
- Sandstrom M, Wilen J, Oftedal G, Hansson Mild K. Mobile phone use and subjective symptoms. Comparison of symptoms experienced by users of analogue and digital mobile phones. *Occup Med (Lond).* 2001;51(1):25-35. DOI: [DOI](https://doi.org/10.1093/occmed/51.1.25) 10.1093/occmed/51.1.25 PMID: [11235824](https://pubmed.ncbi.nlm.nih.gov/11235824/)
- Verkasalo PK, Kaprio J, Varjonen J, Romanov K, Heikkilä K, Koskenvuo M. Magnetic fields of transmission lines and depression. *Am J Epidemiol.* 1997;146(12):1037-45. PMID: [9420528](https://pubmed.ncbi.nlm.nih.gov/9420528/)
- Munezawa T, Kaneita Y, Osaki Y, Kanda H, Minowa M, Suzuki K, et al. The association between use of mobile phones after lights out and sleep disturbances among Japanese adolescents: a nationwide cross-sectional survey. *Sleep.* 2011;34(8):1013-20. DOI: [10.5665/SLEEP.1152](https://doi.org/10.5665/SLEEP.1152) PMID: [21804663](https://pubmed.ncbi.nlm.nih.gov/21804663/)
- Wood AW, Loughran SP, Stough C. Does evening exposure to mobile phone radiation affect subsequent melatonin production? *Int J Radiat Biol.* 2006;82(2):69-76. DOI: [10.1080/09553000600599775](https://doi.org/10.1080/09553000600599775) PMID: [16546905](https://pubmed.ncbi.nlm.nih.gov/16546905/)
- Kloss JD, Nash CO, Horsey SE, Taylor DJ. The delivery of behavioral sleep medicine to college students. *J Adolesc Health.* 2011;48(6):553-61. DOI: [10.1016/j.jadohealth.2010.09.023](https://doi.org/10.1016/j.jadohealth.2010.09.023) PMID: [21575813](https://pubmed.ncbi.nlm.nih.gov/21575813/)
- Collins A, Koechlin E. Reasoning, learning, and creativity: frontal lobe function and human decision-making. *PLoS Biol.* 2012;10(3):e1001293. DOI: [10.1371/journal.pbio.1001293](https://doi.org/10.1371/journal.pbio.1001293) PMID: [22479152](https://pubmed.ncbi.nlm.nih.gov/22479152/)
- Kang JH, Chen SC. Effects of an irregular bedtime schedule on sleep quality, daytime sleepiness, and fatigue among university students in Taiwan. *BMC Public Health.* 2009;9(1):248. DOI: [10.1186/1471-2458-9-248](https://doi.org/10.1186/1471-2458-9-248) PMID: [19615098](https://pubmed.ncbi.nlm.nih.gov/19615098/)
- Yeung WF, Chung KF, Chan TC. Sleep-wake habits, excessive daytime sleepiness and academic performance among medical students in Hong Kong. *Biol Rhythm Res.* 2008;39(4):369-77. DOI: [10.1080/09291010701425124](https://doi.org/10.1080/09291010701425124)
- Lund HG, Reider BD, Whiting AB, Prichard JR. Sleep patterns and predictors of disturbed sleep in a large population of college students. *J Adolesc Health.* 2010;46(2):124-32. DOI: [10.1016/j.jadohealth.2009.06.016](https://doi.org/10.1016/j.jadohealth.2009.06.016) PMID: [20113918](https://pubmed.ncbi.nlm.nih.gov/20113918/)
- Vail-Smith K, Felts WM, Becker C. Relationship between sleep quality and health risk behaviors in undergraduate college students. *Coll Student J.* 2009;43(3):924.
- Lohitashwa R, Kadli N, Kisan R, Sindhuja A, Deshpande D. Effect of stress on sleep quality in young adult medical students: a cross sectional study. *Int J Res Med Sci.* 2017;3(12):3519-23.
- Reeve KL, Shumaker CJ, Yearwood EL, Crowell NA, Riley JB. Perceived stress and social support in undergraduate nursing students' educational experiences. *Nurse Educ Today.* 2013;33(4):419-24. DOI: [10.1016/j.nedt.2012.11.009](https://doi.org/10.1016/j.nedt.2012.11.009) PMID: [23246284](https://pubmed.ncbi.nlm.nih.gov/23246284/)
- Maville JA, Kranz PL, Tucker BA. Perceived stress reported by nurse practitioner students. *J Am Acad Nurse Pract.* 2004;16(6):257-62. PMID: [15264612](https://pubmed.ncbi.nlm.nih.gov/15264612/)
- Owens J, Maxim R, McGuinn M, Nobile C, Msall M, Alario A. Television-viewing habits and sleep disturbance in school children. *Pediatrics.* 1999;104(3):e27. PMID: [10469810](https://pubmed.ncbi.nlm.nih.gov/10469810/)
- BaHammam A, Bin Saeed A, Al-Faris E, Shaikh S. Sleep duration and its correlates in a sample of Saudi elementary school children. *Singapore Med J.* 2006;47(10):875-81. PMID: [16990963](https://pubmed.ncbi.nlm.nih.gov/16990963/)
- Angelone AM, Mattei A, Sbarbati M, Di Orio F. Prevalence and correlates for self-reported sleep problems among nursing students. *J Prev Med Hyg.* 2011;52(4):201-8. PMID: [22442926](https://pubmed.ncbi.nlm.nih.gov/22442926/)
- Lemma S, Gelaye B, Berhane Y, Worku A, Williams MA. Sleep quality and its psychological correlates among university students in Ethiopia: a cross-sectional study. *BMC Psychiatry.* 2012;12(1):237. DOI: [10.1186/1471-244X-12-237](https://doi.org/10.1186/1471-244X-12-237) PMID: [23270533](https://pubmed.ncbi.nlm.nih.gov/23270533/)
- Chernomas WM, Shapiro C. Stress, depression, and anxiety among undergraduate nursing students. *Int J Nurs Educ Scholarsh.* 2013;10(1):255-66. DOI: [10.1515/ijnes-2012-0032](https://doi.org/10.1515/ijnes-2012-0032) PMID: [24200536](https://pubmed.ncbi.nlm.nih.gov/24200536/)
- Benavente SB, Silva RM, Higashi AB, Guido Lde A, Costa AL. [Influence of stress factors and socio-demographic characteristics on the sleep quality of nursing students]. *Rev Esc Enferm USP.* 2014;48(3):514-20. PMID: [25076281](https://pubmed.ncbi.nlm.nih.gov/25076281/)
- Unger M. The Relationship Between Self-Compassion, Sleep Quality, and Perceived Stress Among Undergraduate and Graduate Students. *Philadelphia Philadelphia college of osteopathic medicine;* 2016.
- Sajadi SA, Farsi Z, Rajaei N, Mazhari MS, Habibi H. Sleep quality and the factors affecting the fatigue severity and academic performance of students at AJA University of Medical Sciences. *J Adv Med Educ.* 2016;1(2):9-15.
- Buyssse DJ, Reynolds CF, 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res.* 1989;28(2):193-213. PMID: [2748771](https://pubmed.ncbi.nlm.nih.gov/2748771/)
- Farrahi J, Nakhaee N, Sheibani V, Garrusi B, Amirkaifi A. Psychometric properties of the Persian version of the Pittsburgh Sleep Quality Index addendum for PTSD (PSQI-A). *Sleep Breath.* 2009;13(3):259-62. DOI: [10.1007/s11325-008-0233-3](https://doi.org/10.1007/s11325-008-0233-3) PMID: [19023608](https://pubmed.ncbi.nlm.nih.gov/19023608/)
- Farrahi Moghaddam J, Nakhaee N, Sheibani V, Garrusi B, Amirkaifi A. Reliability and validity of the Persian version of the Pittsburgh Sleep Quality Index (PSQI-P). *Sleep Breath.* 2012;16(1):79-82. DOI: [10.1007/s11325-010-0478-5](https://doi.org/10.1007/s11325-010-0478-5) PMID: [21614577](https://pubmed.ncbi.nlm.nih.gov/21614577/)
- Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav.* 1983;24(4):385-96. PMID: [6668417](https://pubmed.ncbi.nlm.nih.gov/6668417/)
- Sepahvand T, Gilani R, Zamani B. The relationship between explanatory (attribution) styles with perceived stress and general health. *J Psychol.* 2009(12):27-43.
- Jenaro C, Flores N, Gomez-Vela M, Gonzalez-Gil F, Caballo C. Problematic internet and cell-phone use: Psychological, behavioral, and health correlates. *Addict Res Theory.* 2007;15(3):309-20. DOI: [10.1080/16066350701350247](https://doi.org/10.1080/16066350701350247)
- Golmohammadian M, Yyasminejad P. Normalization, validity and reliability of Cell-phone Over-use Scale (COS) among university stu-

- dents. 2011;6(19):37-52.
38. Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J Pers Soc Psychol.* 1986;51(6):1173-82. [PMID: 3806354](#)
 39. Jin-jian Z. Studying on the relationship among perceived stress, motivation of using mobile phone and mobile phone dependence of college students. *Chin Health Serv Manag.* 2015;2:023.
 40. Yogesh S, Abha S, Priyanka S. Mobile usage and sleep patterns among medical students. *Indian J Physiol Pharmacol.* 2014;58(1):100-3. [PMID: 25508317](#)
 41. Thomee S, Harenstam A, Hagberg M. Mobile phone use and stress, sleep disturbances, and symptoms of depression among young adults—a prospective cohort study. *BMC Public Health.* 2011;11(1):66. [DOI: 10.1186/1471-2458-11-66](#) [PMID: 21281471](#)
 42. Silva M, Chaves C, Duarte J, Amaral O, Ferreira M. Sleep Quality Determinants Among Nursing Students. *Future Academy Multidisciplinary Conference Iceptsy & Cpsyc & Icpsirs & Be-Ci2016.* p. 999-1007.
 43. Samaha M, Hawi NS. Relationships among smartphone addiction, stress, academic performance, and satisfaction with life. *Comp Hum Behav.* 2016;57:321-5. [DOI: 10.1016/j.chb.2015.12.045](#)
 44. Reinecke L, Hartmann T, Eden A. The Guilty Couch Potato: The Role of Ego Depletion in Reducing Recovery Through Media Use. *J Commun.* 2014;64(4):569-89. [DOI: 10.1111/jcom.12107](#)
 45. Lee Y-K, Chang C-T, Cheng Z-H, Lin Y. Helpful-stressful cycle? Psychological links between type of mobile phone user and stress. *Behav Inf Technol.* 2016;35(1):75-86.
 46. Reinecke L, Aufenanger S, Beutel ME, Dreier M, Quiring O, Stark B, et al. Digital stress over the life span: The effects of communication load and internet multitasking on perceived stress and psychological health impairments in a German probability sample. *Media Psychol.* 2016:1-26.
 47. Carter O. The Relationship Between Perceived Stress Levels and Sleep/Wake Patterns, Hours of Sleep, and Reported Quality of Sleep of Senior Nursing Students. California: Dominican university of California, 2016.
 48. Myers SB, Sweeney AC, Popick V, Wesley K, Bordfeld A, Fingerhut R. Self-Care Practices and Perceived Stress Levels Among Psychology Graduate Students. *Train Educ Profes Psychol.* 2012;6(1):55-66. [DOI: 10.1037/a0026534](#)
 49. Mastin DF, Bryson J, Corwyn R. Assessment of sleep hygiene using the Sleep Hygiene Index. *J Behav Med.* 2006;29(3):223-7. [DOI: 10.1007/s10865-006-9047-6](#) [PMID: 16557353](#)
 50. Tanaka M, Fukuda S, Mizuno K, Kuratsune H, Watanabe Y. Stress and coping styles are associated with severe fatigue in medical students. *Behav Med.* 2009;35(3):87-92. [DOI: 10.1080/08964280903231979](#) [PMID: 19812026](#)
 51. Gupta N, Garg S, Arora K. Pattern of mobile phone usage and its effects on psychological health, sleep, and academic performance in students of a medical university. *Natl J Physiol Pharmacol.* 2016;6(2):132-9.
 52. Van den Bulck J. Adolescent use of mobile phones for calling and for sending text messages after lights out: results from a prospective cohort study with a one-year follow-up. *Sleep.* 2007;30(9):1220-3. [PMID: 17910394](#)